Centre Number						Candidate Number				
Surname						Other Names				

Notice to Candidate. The work you submit for assessment must be your own. If you copy from someone else or allow another candidate to copy from you, or if you cheat in any other way, you may be disqualified.

Candidate Declaration. I have read and understood the Notice to Candidate and can confirm that I have produced the attached work without assistance other than that which is acceptable under the scheme of assessment.

Candidate Signature		Date	

For Teacher's Use	
Section	Mark
Section 1 (/20)	
Section 2 (/30)	
TOTAL (max 50)	

General Certificate of Secondary Education
June 2012 and January 2013

Science A SCA4/PU1.1

Controlled Assessment ISA PU1.1 Solar Cells Section 2
For moderation in May 2012 or January 2013

For this paper you must have:
- results tables and charts or graphs from your own investigation
- your Candidate Research Notes
- the Secondary Data Sheet (enclosed)
- a pencil and a ruler.

You may use a calculator.

Time allowed
- 50 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for Section 2 is 30.
- The maximum mark for the Controlled Assessment is 50.
- You are reminded of the need for good English and clear presentation in your answers.

Details of additional assistance (if any). Has the candidate received any help or information from anyone other than the subject teacher(s) in the production of this work? If the answer is yes, give the details below or on a separate page.

Yes ☐ No ☐

Teacher Declaration:
I can confirm that the candidate's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied that to the best of my knowledge the work produced is solely that of the candidate.

Signature of teacher ..... Date .....

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Hypothesis: *The output voltage from a solar cell depends on the area of the solar cell exposed to the light.*

1 (a) What were the variables in the investigation you did?

The independent variable was..... .

The dependent variable was ..... .

One control variable was ..... .

(3 marks)

1 (b) Resolution means the smallest scale division of a measuring instrument.

What was the resolution of the voltmeter that you used?

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Do you think that this resolution was appropriate for this measurement?

Explain your answer.

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(3 marks)

1 (c) Did you repeat any of the results in your investigation?

Explain why you did or did not repeat any of your results.

Your explanation should include examples from your results.

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(3 marks)

1 (d) In your investigation you changed the area of the solar cell exposed to the light.

What was the range of this variable?

The range was from ..... cm^2 to ..... cm^2

If you had been able to use another value of this variable, either within or outside this range, what value would you have chosen?

Give a reason for your answer.

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(3 marks)

Question 1 continues on the next page

1 (e) The hypothesis that you were given before you started the investigation was:

The output voltage from a solar cell depends on the area of the solar cell exposed to the light.

Do your results support this hypothesis?

Explain your answer.

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(3 marks)

2 You have been given a Secondary Data Sheet that provides results from similar investigations.

2 (a) Draw a sketch graph of the results in Case study **1**.

The graph should show how the mean output voltage varies with the area of the solar cell exposed to light.

(2 marks)

2 (b) Explain whether or not the results on the Secondary Data Sheet support the hypothesis you were given.

To gain full marks your explanation should include appropriate examples from the results in Case studies **1**, **2**, and **3**.

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(3 marks)

2 (c) Use Case study **4** to answer this question.

The students who did this investigation said:
"*The graph shows that the output voltage is directly proportional to the light intensity*."

Criticise the way in which the students have drawn the graph and explain whether or not you agree with their conclusion.

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(3 marks)

3 How could the results from your investigation be useful in the context you have researched?

You may use information from your Candidate Research Notes to help you to answer this question.

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(3 marks)

4 Make sure that you hand in your Candidate Research Notes, results tables, and chart or graph with this paper.

You will be awarded up to four marks for your chart or graph.

(4 marks)

30

END OF QUESTIONS